FTTN for Broadband Overlay

Distribution Intercept Enables Familiar Practices, Lower Costs

APPLICATION NOTE

Introduction

Fiber-to-the-node (FTTN) is a highly successful architecture deployed worldwide that uses existing copper distribution pairs for broadband service delivery. By placing fiber-fed DSLAMs near existing cross boxes or even deeper into the network and creating distribution areas sized 3,000 to 5,000 feet, service providers are able to provide subscribers with 25 to 30 Mb/s. In fact, for smaller distribution areas such as high density city blocks and multiple dwelling units (MDU), and depending on what technology is used, broadband service over existing copper pairs can range from 30Mb/s to 50 Mb/s and above. This is just with today's xDSL technology.

Method for Broadband Overlay

Today's method for xDSL overlay is proven: interrupt the customer's existing voice circuit, re-route dial tone into the DSLAM (which combines low frequency voice and high frequency data onto the same pair), and then re-connect the combined POTS/xDSL output to the cable pair serving the customer. For customers within 3 to 5 kft of the central office (CO), established craft practices and infrastructure within the CO suits this method just fine. The DSLAM is terminated on the main distribution frame (MDF) on a block labeled inputs and outputs. To deploy broadband service the frame technician simply disconnects the jumper that connects the switch voice circuit to the outside plant cable pair, runs a new jumper from the switch port to the input of the DSLAM and a jumper from the output of the DSLAM back to the outside plant cable pair. This is standard operating procedure.

Yet once you leave the structured CO environment for the outside plant, broadband overlay introduces new challenges.

Situation #1

There are many existing customers within 3 to 5 kft of a DLC-fed cross box, where feeder and distribution cables have appearances. Here, cross connect jumpers connect the customer's cable pair with the dial tone circuit. In this situation the DSLAM could be located in the DLC cabinet or a standalone DSLAM cabinet could be placed. In either case the inputs and outputs from the DSLAM must be terminated inside the cross connect cabinet in order to support broadband service delivery. This can be done if there are spare binding posts available to terminate the cables in and out of the DSLAM. In order to terminate 100 DSLAM ports it requires 200 spare pairs worth of binding posts.

For this situation, there are some potential barriers that could cause delays, increase costs and introduce new sources of failure:

- Are enough spare binding posts available in the cross box for DSLAM terminations?
- If available, what is the condition of cross box binding posts?
- If spare binding posts are not available, what is the expense to re-skin the cross box?
- What is the distance from the cross box to the DSLAM cabinet?

Situation #2

There are many customers within 3 to 5 kft of multiple cross boxes, yet one DLC cabinet serves more than one cross box. In this situation, the architecture must be fixed; advance decisions must be made on how to physically split DSLAM ports into each of the cross boxes. As a result, new challenges arise that can cause service delays and increased operating costs.

- How do you plan for optimum port capacity in each cross box?
- What if there were 50 DSLAM appearances in cross box A, 25 in cross box B, and the 26th customer served by cross box A wants broadband service? What is the cost for plant rearrangements to provide additional pair counts for cross box A?

Situation #3

For customers residing more than 3 to 5kft from the CO or cross box, the practical reach of xDSL technologies is exceeded. Distribution areas that may range from 12 to 15 kft must be re-sectioned to create smaller serving areas in order to get optimum bandwidth to each customer. Re-sectioning the distribution area now requires more interface locations and, in some cases, placing of interfaces where there are none today. The other way to handle this is with pair bonding to extend reach, yet this means more expensive DSLAM ports must be used. Gaining access to dial tone in these areas for injecting broadband onto customer circuits now presents new challenges.

- How do you handle loops beyond the newly set distance limit of the cross box?
- What if there is no interface such as a cross box deep in the network, just distribution cable? How will broadband services be provisioned?

The Distribution Intercept Solution

Each of the situations described above is unique. Yet the basic problem to be solved is the same—how to economically inject broadband onto the customer's existing voice circuit. In the CO, the process is simple, controlled and straightforward: create DSLAM appearances on a frame and use a couple of jumpers to route the customer's circuit through the DSLAM and back onto the outside plant cable pairs.

ADC has ported this familiar, simple process for broadband delivery in the CO to the outside plant with its patented Distribution Intercept (DI) technology in OmniReach® NCX-1000 FTTN Service Delivery Cabinets. Essentially, DI enables placement of a distribution field anywhere in the network for cross connecting existing voice circuits with DSLAM in/out appearances. Only simple, straight splicing is required to prepare the DI-enabled cabinet for broadband service delivery.

Where there are no spare binding posts in the cross box, the NCX-1000 provides a cost-effective alternative to re-skinning or replacing the cross box. Where multiple cross boxes are served by one DLC, the NCX-1000 provides cross connects so DSLAM ports are accessed without plant rearrangements. Where there is no interface deep in the network, the NCX-1000 provides cross connect and integrated DSLAM in one cabinet.

The key technologies that make DI a versatile, cost effective FTTN solution include the following:

- LSA-PLUS® blocks provide gas-tight, corrosion resistant IDC terminations for the outside plant using 45 degree angled, silver plated contacts and special clamping ribs to reduce movement once pairs are terminated.
- Integral look both ways monitoring allows testing in either direction without lifting wires.
- DSLAM circuit protection and cross connect in the same footprint with ComProtect saves valuable cabinet space in the outside plant.

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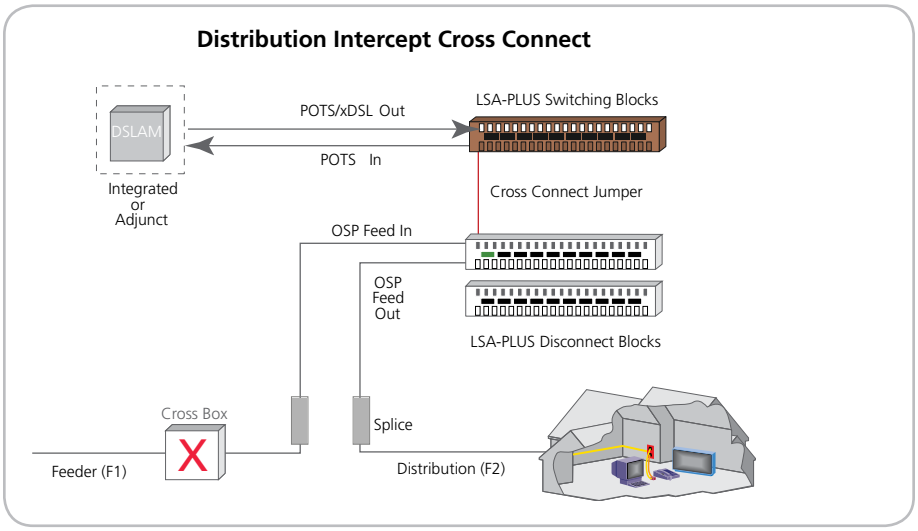
Implementation of Distribution Intercept

DI allows you to add an NCX-1000 cross connect cabinet to the network with only simple, straight splicing of feeder or distribution cable. As in the CO, DSLAM appearances are terminated on blocks; in the outside plant, on high performance LSA-PLUS *brown* switching blocks within the cabinet. The fiber-fed DSLAM can be located on the same pad or nearby. Alternatively, the NCX-1000 can be outfitted with an integrated, hardened brick DSLAM.

Then, as in the CO, customer outside plant cable pairs are terminated on a different set of blocks; in the outside plant, on LSA-PLUS high performance *white* disconnect blocks in the cabinet. These blocks are configured with normally closed contacts so that once outside plant pairs are terminated onto the block, voice service is immediately available.

Finally—just as in the CO—DI enables grooming of broadband service onto any circuit pair by running a single jumper from the brown block (DSLAM appearances) to the white block (customer pairs). In the CO, broadband provisioning occurs at one location on the MDF. In the outside plant, broadband provisioning is also centralized at one location in the feeder or distribution network where you place the NCX-1000.

NCX-1000 with Distribution Intercept and integrated DSLAM



APPLICATION NOTE

Benefits of Distribution Intercept

The first and most important benefit of DI is the ability to place the NCX-1000 cross connect cabinet exactly where needed in the network. This is important when planning or re-sectioning distribution areas. Simple, straight splicing onto feeder or distribution outside plant cable is all that is required, which minimizes construction costs and speeds time to market.

When placed in the feeder network the challenge of multiple cross boxes fed by a single DLC is addressed, avoiding any situation where additional pair counts would need to be rearranged. The DI-enabled cabinet offers cross connect functionality, enabling any-to-any activation of DSLAM ports to OSP pairs—just like in the CO.

The ADC FTTN DI solution is ideal for splicing into distribution outside plant cable. Situations where serving areas are re-sectioned and there is no existing interface are a perfect fit for this solution. Simply splice into the distribution cable and broadband services can now be delivered within the required loop length.

Another important benefit is familiarity for technicians. No matter where in the network DI is used, the installation and provisioning is the same. For small cabinets, large cabinets, and even for vendor-specific cabinets, the service delivery cross connect looks identical. This helps to reduce training curves and improve productivity.

In addition, service activations are faster and more accurate with the DI solution. The unique monitor, look-both-ways testing capability allows technicians to analyze each component of the circuit prior to turn up, ensuring successful customer activation. The normally closed termination blocks always default to the customer having dial tone. Unlike existing methods of broadband service delivery where the cross connect jumper is removed and re-wired to activate service, a jumper is only added when broadband service is required. This ensures a higher quality of service level and less chance of customer complaint.

Finally, DI is cost-effective. Installation and service activation is less labor intensive. From a capital perspective, the DI-enabled NCX-1000 can cost much less than costly retrofit of existing cross boxes and provides a small footprint for integrated DSLAM and cross connect in portions of the distribution network with no interface today.

Additional benefits of DI include the following:

- Enables deep distribution area deployment where no interface currently exists
- Supports pair bonding
- Enables delivering dry DSL services
- Unique activation plug offers visual indication of working broadband customer

More Information

For more information on the family of NCX-1000 FTTN Service Delivery solutions, visit www.adc.com/fttx.

Website: www.adc.com

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105567AE 06/08 Revision © 2008, 2007 ADC Telecommunications, Inc. All Rights Reserved